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AUTHOR Danielson, Mary Ann; Mitchell, Nancy
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ABSTRACT

A study explored the relationship between creative problem solving and group decision making techniques as measured by the outcome variables identified in earlier studies. Subjects, 46 undergraduate students enrolled in communication courses at 2 midwestern universities, were divided into 3 groups, a Nominal Group Technique (NGT), Unstructured Group Activities (UGA), and individual participation (IND). Subjects were asked to generate possible themes/topics for a new magazine targeting college and university students, and then to complete questionnaires. Results indicated that: (1) use of the NGT led to a larger quantity of ideas generated, but generally reflected less evidence of group process and lower satisfaction, confidence, and efficiency; and (2) observations of UGA groups detected more "piggy backing" or "springboarding" of ideas among group members during interaction. Findings suggest that the NGT is useful but not optimal for creative decision making, and that the advantages of both the NGT and UGA structures are enhanced when combined. (Contains 19 references and 1 table of data. An appendix presents the questionnaire and instructions for members of the various groups.) (RS)

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# Creative Problem Solving:
# A Comparison of Techniques

by
Mary Ann Danielson
Creighton University
and
Nancy Mitchell
University of Nebraska-Lincoln

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Creative Problem Solving: A Comparison of Techniques

Creativity. Once scorned as being less valuable than rational, logical thinking, creativity and creativity training are taking over business and industry. While some futurists are predicting a creative revolution to supercede the agricultural, industrial, and informational revolutions of the past (LaBarre, 1994a), most individuals just acknowledge the importance of creativity, especially to today's businesses. According to Day (1994), business' fascination with creativity and initiative borders on obsessive; in fact, "unshackling our workers to allow their creative juices to flow has been the ultimate objective of just about everything from quality circles to reengineering" (p. 7).

While corporate creativity traces its roots to the 1950s, it has truly blossomed in the 1980s and 1990s. Recent surveys indicate that 25-30% of all organizations offer some form of creativity training (Solomon, 1990; Voss, 1991); according to Solomon (1990), that is an increase of 540% from four years ago.

Concurrent with the increasing emphasis on creativity training is the rise in the number and variety of creativity programs offered. Numerous authors have written on the topic of creativity; several centers for creativity have been created (e.g., Center for Creative Leadership and the Du Pont Center for Creativity and Innovation); software has been designed, and programs, such as the Creative Whack Pack, Pocket Innovator, and Six Thinking Hats, packaged for corporate use. Regardless of which type of program is selected or utilized, the main goal of creativity training is to learn new ways of interacting with the "information-rich environment so as to structure it in such a way as to do something with it" (Shephard, in Solomon, 1990, p. 66).

In promoting creativity and creative problem solving, most trainers will admit that there is no longer "one best way" of approaching problems. What is really needed is a

"tool chest" of ideas so that individuals "can apply the proper tool at the proper time" (Shephard, in Solomon, 1990, p. 66) and in the proper form. While most creativity research focuses on specific "tools" or techniques, very few researchers/consultants consider the structure or form by which to approach creativity. Creative problem solving uses both individuals and groups, each with its own unique advantages and disadvantages, however, the group format has been the predominant focus of creativity research.

Group research has historically followed two paths: individualistic and group-oriented approaches to small group research (Steiner, 1974). Adopting either the sociologically-based group-oriented or the "Gestalt" psychological approach, small group results would seem to indicate that small groups are not mere collections of individuals (Lewin, 1951) and, therefore, differ from individuals in how they solve problems.

Unfortunately, the creativity literature does not generally account for these differences. While most training is conducted in groups or teams, the types (structured versus unstructured, small versus large, mixed versus same-gendered teams) of small group structures are not considered. Conversely, most small group research focuses on decision-making and problem-solving exercises where creativity is not the central focus. To bridge the gap between creativity training research and small group decision making, this paper compares small group and individual efforts at addressing a creative project. Specifically, this paper will explore the relationship between creativity and small group research, propose research questions and hypotheses, and conclude with results and recommendations for the incorporation of small group structures in creativity training and practice.

Creativity training

Creative problem solving is one way to tap employees' thinking. Creativity requires that individuals look at problems from a number of different perspectives, think in broad categories, and generate a variety of solutions. In general, the purpose of creative thinking "is to develop novel and unusual ideas" (Keeney, 1993, p. 52). By allowing employees to creatively solve problems, corporations are encouraging individual expression and hoping for happier, more cohesive, and more productive employees.

Creative training methods fall along a spectrum. On one end of the spectrum are behaviorists who ignore creativity and simply examine what worked for others in the past. Success with a particular strategy is taken as a predictor of success in using that strategy in the future. On the other end of the spectrum are the emerging ideas of Kamin and Muszynski (Hequet, 1992). Kamin utilizes fables to stimulate creativity, whereas Muszynski uses music (drums) as a metaphor for his exercises. Most creativity programs fall in the middle of the range and tend to focus on brainstorming. While brainstorming can be done both individually and in groups, it is expected that more and more companies will be relying on group brainstorming (Rogers, in Solomon, 1990, p. 70). In fact, given the growing organizational emphasis on teams and team-oriented structures, it would seem that small groups are and will continue to be the forum for creative problem solving.

One of the few studies conducted involving creative group problem solving focused on Carter's strategies at the 1978 Camp David Summit (Hare & Naveh, 1985). President Carter met with Egyptian President Anwar el-Sadat and Israeli Prime Minister Menachem Begin in 1978 in order to forge a Middle East peace agreement. Carter used both socio-emotional and task creativity to bring the two parties to

agreement. His strategies for a successful resolution were dependent on both parties talking to one another (in verbal and/or written form).

While the Hare and Naveh (1985) study highlights the importance of communication in political problem solving, communication is equally important in other types of problem solving. LaBarre (1994b) stresses the importance of communication in successfully managing employees of the "creative revolution." Unfortunately, neither Hare and Naveh (1985) nor La Barre (1994b) offer any explanation or empirical support for types of group structure that promote communication. While it is true that creative individuals may need a "tool chest" of creativity-generating options, they may find that certain group structures are better than others at facilitating communication and creativity.

Small group problem solving techniques

Small group problem solving can be structured or unstructured; however, small group research seems to indicate that "structured techniques are needed to ensure a solution's quality, acceptance, and implementation" (Frankel, 1987, p. 545). The majority of the research focuses on structured problem solving, and the most common forms include brainstorming, the Delphi technique, consensus decision making, and the Nominal Group Technique (NGT). Developed by Delbecq and Van de Ven (1971), NGT is considered to be one of the best structured techniques (Bartunek and Murninghan, 1984, in Frankel, 1987, p. 545) utilized in problem solving and decision making research.

As described by O'Neil and Jackson (1983), NGT is a structured activity facilitating group-based decision making. It is a group in name only, hence, the "nominal" group designation. Group interaction, when it is allowed to occur, is strictly controlled by the leader. Verbal interaction is limited, to the extent possible, to leader-

individual member dialogue. Two of the key elements of the NGT are depersonalization (i.e., separating ideas from personalities) and allowing equal participation in the discussion process (Lowry, 1991, p. 21).

While based on the "accepting ideas without valuing them" premise of brainstorming groups, NGT's unique characteristics distinguish it from both brainstorming and other problem-solving groups. In its original form, NGT was characterized by (a) individual work preceding group discussion, (b) round-robin reporting to communicate ideas among the group members, (c) a period of unstructured group discussion [in its modified form, group discussion is limited to clarification, elaboration, and merging of common ideas], (d) individual polling of members to converge on a specific solution, and (e) face-to-face individual and group work (Hegedus & Rasmussen, 1986, p. 546). NGT, in its original form, has been criticized for assuming that the problem statement and solutions are clearly understood, allowing only one solution, and not providing a mechanism for developing synergistic solutions (Frankel, 1987).

Because of these and other limitations, the Nominal Group Technique (NGT) has been modified and supplemented by various authors. Hegedus and Rasmussen (1986) utilized a modified NGT to study an evaluation problem. Thomas, McDaniel, and Dooris (1989) combined NGT with decision analysis to analyze strategic issues. Finally, Frankel (1987) combined NGT with multidimensional scaling (MDS) to investigate solutions to ill-structured problems. While the results were somewhat mixed, the research seems to conclude that nominal groups can outperform other groups under certain circumstances. The exact circumstances tend to depend on the nature and characteristics of the task. Hegedus and Rasmussen (1986) concluded that the NGT may be useful but insufficient as a decision procedure when groups are faced with complex, ill-structured, multi-level decisions.

Some creativity training groups have utilized aspects of the NGT in their programs. For example, a typical seminar on creative thinking conducted by Mattimore Communications (a creativity consulting firm) requires participants to begin the problem solving process a week or two before the group actually meets. Participants generally receive a ten- to twenty-page briefing document that explains a specific problem. "This way," says Mattimore, "everyone has a chance to work on the issue and we can hit the ground running" (Mattimore, in Voss, 1991, p. 38). Mattimore emphasizes the individual's work preceding the group work aspect of the NGT; however, other aspects of the NGT are not followed. In practice, creativity trainers utilize small group settings, borrow sporadically from various brainstorming, consensus, and NGT techniques, but rarely, if ever, base their choices on empirically tested relationships between small group structure and problem solving techniques.

A comparison of techniques

Reviewing previous research that compares nominal groups to other decision making styles, the following variables have been studied: quantity of ideas generated, equal opportunity for participation, group satisfaction, confidence in decision, efficiency and effectiveness of the group (Hegedus & Rasmussen, 1986; O'Neil & Jackson, 1983). None of the previous research with these variables studied creative problems. Therefore, this study examines the relationship between creative problem solving and group decision making techniques as measured by the outcome variables identified in the Hegedus and Rasmussen (1986) and O'Neil and Jackson (1983) research.

Three common techniques identified by the decision making literature include: nominal group technique (NGT), unstructured group activities (UGA) and individual participation (IND). NGT groups are highly structured groups led by a facilitator, who

limits group interaction. UGA groups and individuals (IND) function independent of any outside facilitation.

Drawing upon the findings of Hegedus and Rasmussen (1986) and O'Neil and Jackson (1983), the following research questions and hypotheses are offered.

*Volume.* It is expected that NGT groups will generate the greatest number of ideas because the idea generation stage involves both the individual creation of ideas and a round-robin style of sharing those ideas.

H1: The volume of ideas generated is greatest for NGT groups.

*Group process.* NGT groups require active participation by all members. Additionally, group members are allowed to seek clarification and elaboration. Because of the forced participation nature of the NGT, it is expected that participation of group members would be more equal, with members listening to one another and seeking elaboration in NGT groups. The following three hypotheses are proposed:

H2: The degree to which members listened to each other is rated higher by members of NGT groups than by members of UGA groups.

H3: The degree to which group members perceived participation was equal is rated higher by NGT group members than by UGA group members.

H4: The degree to which group members asked one another to elaborate is rated higher by NGT group members than by UGA group members.

*Satisfaction.* One of the claimed advantages of NGT is high group satisfaction with the process (O'Neil & Jackson, 1983). It is assumed that because all individuals participate, satisfaction with individual contributions and satisfaction with the group process will both be high. However, NGT does not allow for social interaction between the members. Small group scholars (Brilhart & Galanes, 1992; Forsyth, 1990) agree that interaction between group members is an essential component that characterizes

small groups. Interaction, according to Bales' equilibrium model (1965), has both task and socio-emotional components; the group spends the majority of its time attempting to balance the task and socio-emotional needs of the group. Given that UGA groups are allowed to interact and potentially develop both social and task dimensions of decision making, it is expected that they could also develop high group satisfaction. Because there are no clear indications of the effect of group structure on satisfaction, the following two questions are proposed:

> RQ 1: Is there a significant difference in levels of individual "satisfaction with the group decision" between NGT group members, UGA group members, and individuals (INDs)?
>
> RQ 2: Is there a significant difference between NGT group members, UGA group members, and INDs in the degree to which they are satisfied with the process by which the decision was reached?

*Confidence.* The sharing of ideas between group members should heighten the degree of confidence perceived by individuals working in groups. However, interaction between group members may highlight deficiencies in group thinking, thereby reducing one's confidence in the group's decision. Individuals, on the other hand, have no opportunity for reinforcement of ideas and theoretically should be less confident of their decision. Individuals, who prefer to work alone, may be more confident in their decision. It is expected that differences may occur between the three decision making structures; however, based on previous literature, there is no clear indication as to the nature of those differences. Therefore, the following two research questions are posed:

> RQ3: Is there a significant difference in level of "confidence in the decision" between NGT group members, UGA group members, and INDs?

RQ4: Is there a significant difference in level of "confidence about their individual participation in the project" between NGT group members, UGA group members, and INDs?

*Efficiency.* Unstructured groups, which are able to develop both task and social dimensions, may find that social elements detract from their task performance. UGA members may find their experiences more satisfying but less efficient. Structured groups (NGT) moderated by a facilitator and individuals (IND), who are not distracted by other group members, should rate their performance as efficient.

H5: NGT group members and INDs rate themselves significantly higher than UGA group members on efficiency.

## Methods

### Participants

Data were collected from 46 undergraduate students enrolled in communication courses at two midwestern universities. Participants were divided into one of three groups, NGT group (N=16), UGA group (N=20), or individuals (N=10). NGT and UGA groups consisted of four members. While O'Neil and Jackson (1983) regard a group of 8-10 persons as optimal for the NGT process, a summary of research findings (Hegedus & Rasmussen, 1986) indicates as many positive findings for NGT or unstructured (UGA) groups containing three or four members as groups composed of seven or eight members; thus, size of the groups did not affect the research outcomes. The participants included both men (N=21) and women (N=21). NGT groups consisted of one all female group, one all male group, and two mixed gender groups UGA groups consisted of one all female group and four mixed gender groups. Individuals were both male (N=4) and female (N=3). (Three individual's responses were not usable.)

The task

The task involved solving a creative problem. Specifically, the participants were asked to generate possible themes/topics for a new magazine targeting college and university students. Their objective was to generate a list of potential themes and then select the one theme that they believed would be best for the important initial issue of the magazine. (Examples of the participants' information sheets are included in Appendix A.)

Procedures

*NGT Group.* Each of the four NGT groups met with a researcher who informed the members of the four-step procedure. After familiarizing the group with the task, the researcher instructed members of the group to work individually, for ten minutes, to generate potential themes (step one). They were informed that after the ten-minute period they would be required to share their themes with the rest of the group. In step two, the individual group members shared their ideas, in a round-robin style, until all ideas were exhausted. Ideas were clarified, elaborated, and merged in step three. No evaluation of ideas was allowed. At the end of step three, the group had a composite list of all suggestions generated. In the final step, group members were polled. Based on a polling method developed by Cook (1981), individuals listed their top seven choices from the composite list. Group members were asked to divide 25 points among the choices and were told that they could distribute the points in whatever manner they wanted; however, every listing had to have at least one point. The theme with the most points would be selected as the group's theme for the first issue of the magazine. The researcher compiled the four individual lists, tallied the results, and announced the selection to the group. Given the "group's" choice, the individuals were asked to complete a one-page questionnaire (See Appendix B). The time limit for the exercise was forty minutes.

*UGA Group.* Five UGA groups were formed and familiarized with the task. Groups were told they had forty minutes to discuss and select the magazine's theme. Once the group agreed that they understood the task and goal, they were allowed to proceed with the decision making process in any manner they chose. Two of the groups worked for forty minutes without a break; the other three groups met for four ten-minute periods over the course of five days. At the end of the forty-minute work period, the group members were asked to submit their lists of suggestions and the one selected theme. The final step of the group activity was the completion of a group questionnaire (See Appendix B).

*Individuals (IND).* Like the NGT and UGA groups, individuals were introduced to the task by the researcher, who then directed them to work independently on the task. They were told they had a maximum of forty minutes to complete the task. Eight individuals accomplished the task in a single period of up to forty minutes; two others worked on the task for ten minutes a day for four days. When the individuals submitted their choices for themes, they were asked to complete a questionnaire that was similar to the questionnaire completed by the NGT and UGA groups. The wording on the individuals' questionnaires was modified to reflect the individual's, not group's, work on the project (See Appendix C).

Questionnaires

The questionnaires completed by participants in the research project were based on those used by Hegedus and Rasmussen (1986). The ten-item questionnaire was divided into demographic and evaluative information. The first two items deal with demographic information such as type of group (NGT, UGA, and IND) and gender (female, male). The remaining eight items were designed to measure the following factors: interaction processes such as listening to one another, equality of participation and elaboration of ideas, satisfaction with the group's decision and with the

individual's contribution to the group, confidence in one's own thinking and in the group's decision, and efficiency of the decision-making process as perceived by the participant. All eight items were seven point Likert-type scales asking the individual to rate the degree to which they believed something occurred (1=not at all and 7=a great deal). All participants were given the opportunity to add additional comments or observations about their participation in an open-ended question at the end of the survey.

Individuals received questionnaires that were similar to those completed by the groups. The wording, however, was modified on items three, four, and five to reflect that the participants worked independently, instead of in groups. Rather than omit these three items, the range of options was changed to reflect eight options, with "0" reflecting a "not applicable" response. It was expected that all individuals would circle "0" for items three, four, and five.

Analysis

The research questions and hypotheses were tested using t-tests and analysis of variance (ANOVA) to assess whether significant differences occurred between the decision making structures. Post hoc analysis, using the Student-Newman-Keuls and the Scheffe tests, was conducted on all statistically significant differences. Insufficient detail of analysis on item ten required the additional use of the Duncan test. The reliability of the measures was assessed using Cronbach's alpha coefficient. Additionally, a frequency count of all items generated was conducted. Finally, responses to the open-ended question were analyzed for emergent themes concerning the group and individual decision making process.

## Results

While 46 participants volunteered for the study, data were collected from 42 participants (NGT (N=16), UGA (N=19), IND (N=7) ). Three individuals and one group member missed one or more sessions and were unable to complete the questionnaire; therefore, their information was excluded for purposes of analysis.

*Volume.* In support of hypothesis 1, the number of unduplicated ideas generated was greatest for the NGT group (IND, $\bar{x}$=14; UGA, $\bar{x}$=24.6; NGT, $\bar{x}$=26.75). It should be noted that the number of unduplicated ideas in one of the NGT groups may not have accurately reflected the work of the group. If this outlier was omitted, the mean of the NGT groups would be considerably higher ($\bar{x}$=33.33).

*Group process.* Contrary to expectations, UGA group members' ratings of listening to each other were significantly higher than NGT group members (NGT, $\bar{x}$=5.56; UGA, $\bar{x}$=6.32, $p \leq .01$). While NGT and UGA group members did not differ significantly in terms of participation, UGA group members rated themselves significantly higher on seeking elaboration than did NGT group members (NGT, $\bar{x}$=3.06; UGA, $\bar{x}$=4.89, $p \leq .01$). According to the criteria of listening, equal participation, and elaboration, UGA group members appear to be more involved in the group process.

*Satisfaction.* Findings indicate significant differences concerning the levels of individual satisfaction with the group decision. Post hoc analysis using the Student-Newman-Keuls revealed significant differences between NGT and UGA group members ($F$ [2, 41] = 4.05, $p \leq .05$), with individuals in UGA groups rating satisfaction with the group decision highest. (See Table 1 for summary of means.)

UGA group members also rated satisfaction with the decision making process highest. Post hoc analysis detected significant differences between UGA group members and both NGT group members and INDs ($F$ [2, 41] = 10.57, $p \leq .01$). NGT

and IND ratings of satisfaction on this variable were approximately the same, as shown in Table 1.

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Insert Table 1 about here

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*Confidence*. No significant differences emerged for either research question concerning confidence in the decision or confidence about the individual participation in the project. Consistent across both questions, UGA members rated confidence higher, but not significantly higher, than NGT group members or IND participants. (See Table 1 for means.) While ratings were not statistically significant, responses to the open-ended question on the questionnaire reveal individual (IND) participants' concern with confidence. Individuals commented that they would have preferred to "have had input other than my own" and were "interested in hearing others [ideas] to make sure I wasn't on the wrong track."

*Efficiency*. The hypothesis concerning perceived efficiency revealed a significant finding, but not in the predicted direction. Members of UGA groups perceived their performances significantly higher in efficiency than NGT group members or INDs ($F [2, 41] = 3.15$, $p \leq .05$). Post hoc analysis using the Duncan test indicated UGA group members were significantly different from individuals in their ratings of efficiency. This result seems to support the concept that small groups are not merely a collection of individuals; rather, groups are capable of creating more than "the sum of its parts."

*Additional responses*. In one of the NGT groups, members commented on the need to sell their ideas better and their concern about the clarification step. Two members of one of the UGA groups provided comments demonstrating a concern about limited

contributions from a shy member. While a number of individuals (IND) did supply comments, their comments tended to center around one theme; they wanted to rely on input other than their own.

The reliability of the measures was assessed using Cronbach's alpha coefficient. A reliability score of .83 was achieved.

## Discussion

The results of this research add to the mixed findings, noted by Frankel (1987), concerning the use of the Nominal Group Technique (NGT). Use of the NGT on a creative problem-solving exercise resulted in a larger quantity of ideas generated, but generally reflected less evidence of group process and lower satisfaction, confidence, and efficiency. Ultimately, the findings reinforce the importance of the task as it relates to the various outcomes. Specifically, our findings suggest that the NGT technique is useful, but not optimal for creative decision making.

The individual generation and group sharing of ideas are facilitated by the NGT technique; however, the technique falls short in the later stages where individuals express preferences for greater interaction. Individuals, in their follow-up comments, repeatedly expressed the desire for the sharing of ideas, as did members of one NGT group.

Researchers' observations of UGA groups detected more "piggy backing" or "springboarding" of ideas between group members during interaction. NGT group members and individuals (IND) were not permitted this option. Given the participants' open-ended comments, the lack of open interaction and participation may explain lower confidence, satisfaction, and perceived efficiency.

It appears that groups attempting creative problem solving would benefit from a mixed NGT-UGA design. The initial steps of NGT, to include individual idea creation

and forced participation in a group setting, will contribute to a higher number of generated ideas and will initiate group interaction. Once ideas are generated and shared, ideas need to be elaborated or clarified. It is clear that the UGA structure facilitates elaboration of ideas. Additionally, the UGA structure allows for a more active form of interaction between members and members' ideas. A combination of the NGT and UGA structures should increase members' satisfaction with both the product and the process by which the product was derived and increase perceptions of group efficiency. It would appear that the advantages of both the NGT and UGA structures are enhanced when combined.

These findings have implications for creative trainers and anyone employing small group decision making structures. It is speculated that the NGT technique, while advantageous for creative projects, will be enhanced when combined with UGA elaboration/interaction. Creative trainers should provide some initial structure and facilitation for their groups, but after idea sharing (step two), trainers should minimize their role in the group. Adaptation of this procedure is illustrated by building upon the Mattimore seminar discussed earlier. This study provides empirical support for Mattimore's initial individual preparation. It would appear that his participants really do "hit the ground running." Once the group is convened and shares their prepared materials, Mattimore would do better to minimize his role in the group. If the group is allowed some latitude in how they proceed to solve the problem, results of this study suggest that group members will be more effective (e.g., generate more possibilities/solutions) and more satisfied with the results.

While these research findings are suggestive and offer some implications for corporate applications, they are not conclusive. Generalizability of findings is potentially limited by the small sample size. Ideally, future research should include a larger number of groups and individuals; although in this study, significant results were

achieved with as few as four groups. Additionally, generalizability is limited by the differences in time allotments and our particular use of the Nominal Group Technique.

Future researchers need to consider the amount of time allocated and the distribution of that time. While all groups and individuals completed the task in forty minutes (or less), Hegedus and Rasmussen (1986) warn that forcing groups to finish within a limited time frame may produce results that confound the effects of the decision procedure. Of greater concern, however, is the possibility that the distribution of time may bias the findings (i.e., favor one decision making structure over another). Most group research is conducted in one setting with a stated amount of time. These "block" or "marathon" sessions may unnecessarily favor the NGT technique or even individual efforts. The NGT was designed to be completed in one sitting. Our results also indicate that individuals were not willing to work on this creative task for the entire forty minutes; only two of the seven individuals used the entire forty-minute period.

The UGA group structure was hindered by the use of a single session. Since interaction and development of both task and social dimensions are important to group functioning, unstructured groups need a different form of time allocation. Unstructured groups need time to allow themselves to develop as groups. Therefore, it is suggested that UGA groups be given the same amount of time, but distribute it over a number of days. However, this distribution of time over a number of days may prompt negative effects such as absences and gaps in data collection and a biasing of the research findings.

Finally, it is important to recognize that the Nominal Group Technique has many modifications. Our particular use of the technique may have influenced our results. If a less stringent version of the technique were used (i.e., greater interaction between group members were allowed), the NGT group members may have scored higher on a number of the dimensions.

Despite these limitations, it is important to remember that the "creative revolution" is upon us and that the "expression of oneself in a creative way. . . is one of the most important things that human beings can do. Therefore, it is one of the most important responsibilities that managers can have-to make that process happen well" (Kao, in LaBarre, 1994a, p. 19). Managers would be well served to consider the structure (NGT + UGA) by which they attempt to foster creativity.

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# Appendix A:
## Individuals' Participation Sheets
## (Nominal Group Technique)

My colleague and I are conducting a study. We would like to thank you for agreeing to participate in our small group exercise.

Scenario: You have been contacted by a publisher who is creating a magazine targeting college students in the United States. Her premiere issue is due out this Fall, and she is actively seeking topic areas/themes (not story ideas unique to individual campuses) for this initial issue. Because she wants it to be a commercial success, the first edition is especially important. She is asking various university students for input.

The task is to generate a list of potential themes (which may be used in later issues) and select the one theme for the initial publication. You will be working individually and as a small group in order to complete the task. I will serve as your facilitator for this project.

The project has four steps:
--Step one: You will work individually for ten minutes. During this ten-minute period, you are to generate a list of potential themes. Do not discuss your list with others at this time. You will be required to share your ideas in step two.
--Step two: Individuals will share their ideas by presenting one idea at a time in a round robin format. Sharing of ideas will continue until all lists have been exhausted. No comments or discussion of ideas will occur at this time.
--Step three: It is at this time that participants will be allowed to ask for clarification of any theme. Any overlapping items may be merged. No evaluation of themes is allowed.
--Step four: Evaluation of items occurs in step four. Each individual has 25 points to distribute among his/her top seven choices. All 25 points must be distributed. Again, there is no discussion among group members as to how the points are to be distributed. Your rankings will be collected, and the results will be shared with you.

At the end of the session, you will be asked to complete a short, one-page questionnaire.

Do you have any questions?

Unstructured Group

My colleague and I are conducting a study. We would like to thank you for agreeing to participate in our small group exercise.

Scenario: You have been contacted by a publisher who is creating a magazine targeting college students in the United States. His premiere issue is due out this Fall, and he is actively seeking topic areas/themes (not story ideas unique to individual campuses) for this initial issue. Because he wants it to be a commercial success, the first edition is especially important. He is asking various university students for input.

Your group's task is to select a theme for the initial publication. You, as a group, will have four ten-minute meetings to generate a list of potential themes (which may be the subject of future issues). Worksheets will be collected at the end of each period, but will be returned at the beginning of the next session. At the end of the fourth session, you will be required to return all worksheets, your list of potential topics, and your group's theme selected for the first issue. At the end of this last session, you will be asked by the facilitators to complete a short, one-page questionnaire.

Do you have any questions?

Individual

My colleague and I are conducting a study. We would like to thank you for agreeing to participate in our small group exercise.

Scenario: You have been contacted by a publisher who is creating a magazine targeting college students in the United States. His premiere issue is due out this Fall, and he is actively seeking topic areas/themes (not story ideas unique to individual campuses) for this initial issue. Because he wants it to be a commercial success, the first edition is especially important. He is asking various university students for input.

Your task is to generate a list potential themes. At the end of the forty minute period, you will be asked to submit your list of potential themes (which could be used in future issues) as well as the theme you have selected for the initial issue. It is at this time, that you will be asked by the facilitators to complete a short, one-page questionnaire.

Do you have any questions?

Appendix B:

## Group Questionnaire

1. Type of group (The facilitator will give you this information).
A. NGT B. UGA A B C D E F G H I J K L

2. Sex: (circle one) A. Female B. Male

**For the following questions, please indicate by circling a number on a 1-7 point scale how you would rate the following:**

3. the degree to which group members listened to one another

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|
| not at all | | | some | | | a great deal |

4. the degree to which participation was equal

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|
| not at all | | | some | | | a great deal |

5. the degree to which group members asked one another to elaborate on their positions

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|
| not at all | | | some | | | a great deal |

6. the degree to which you are satisfied with the group's decision

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|
| not at all | | | some | | | a great deal |

7. the degree to which you are satisfied with the process by which the decision was reached

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|
| not at all | | | some | | | a great deal |

8. the degree of confidence you feel about your own contributions to the group

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|
| not at all | | | some | | | a great deal |

9. the degree of confidence you have in the group's decision

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|
| not at all | | | some | | | a great deal |

10. the degree to which you believe the group performed efficiently

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|
| not at all | | | some | | | a great deal |

**Please share any additional comments you have on the back of this page.**

Appendix C:

## Questionnaire

1. IND A B C D E F G H I J K L M N O P Q R S T U V

2. Sex: (circle one) A. Female B. Male

**For the following questions, please indicate by circling a number on a 1-7 point scale (with '0' if the question is not applicable[na]) how you would rate the following:**

3. the degree to which group members listened to one another

| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| na | not at all | | | some | | | a great deal |

4. the degree to which participation was equal

| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| na | not at all | | | some | | | a great deal |

5. the degree to which group members asked one another to elaborate on their positions

| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| na | not at all | | | some | | | a great deal |

6. the degree to which you are satisfied with your decision

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|
| not at all | | | some | | | a great deal |

7. the degree to which you are satisfied with the process by which the decision was reached

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|
| not at all | | | some | | | a great deal |

8. the degree of confidence you feel about your participation in this project

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|
| not at all | | | some | | | a great deal |

9. the degree of confidence you have in the decision

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|
| not at all | | | some | | | a great deal |

10. the degree to which you believe you performed efficiently

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|
| not at all | | | some | | | a great deal |

**Please share any additional comments you have on the back of this page.**

Table 1

Mean Ratings of Decision Making Structures

| | Decision Making Structure | | |
|---|---|---|---|
| Variables | NGT | UGA | IND |
| Satisfaction | 5.44* | 6.37* | 5.95 |
| Satisfaction / process | 4.75** | 6.21** | 4.71** |
| Confidence / group decision | 5.56 | 5.95 | 5.57 |
| Confidence / ind. participation | 5.63 | 6.11 | 5.71 |
| Efficiency | 5.50 | 6.11* | 5.14* |

Note. Responses ranged from 1 (not at all) to 7 (a great deal). Post hoc analysis using Student-Newman-Keuls, Scheffe, and Duncan tests denote significance between groups. Significance denoted by asterisks: (*) = $p \leq .05$, (**) = $p \leq .01$.